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NEWS

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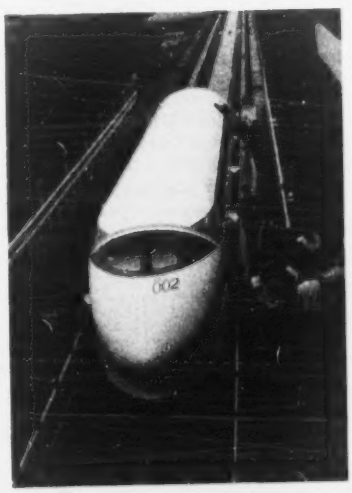

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LETTERS

Reader views on nuclear fusion

As of this writing, the claim of two chemists—B. Stanley Pons, University of Utah, and Martin Fleischmann, University of Southampton—to have "successfully created a sustained nuclear fusion reaction at room temperature" in a lab-top apparatus seems to be reeling under intense scrutiny from the scientific community. However the veracity of the Pons-Fleischmann claim is finally resolved, it has generated great excitement in the chemical community and intensified the letter-writing propensity of C&EN readers. Starting with this issue, the magazine will publish a wide sampling of such letters. Readers should note that because C&EN is a weekly news magazine and not a journal, the letters it carries are not peer reviewed prior to publication.

SIR: Since everyone else is rushing to get out their theories about how cold fusion works (or doesn't), I thought I should get mine into print as rapidly as possible to avoid being scooped. (I will reluctantly forego the immense riches that might possibly be attained by patenting it instead.)

When D_2O is electrolyzed at a palladium cathode (if it is done correctly—not every lab has been able to achieve this!), a new and unknown form of radiation is emitted. This radiation has the special property of affecting that portion of the brain where everything we have learned about the scientific method is stored. Scientists with previously impeccable credentials forget about control experiments, calibration, the careful exclusion of alternate explanations, etc., and call a press conference to explain (without any experimental detail, of course) what their half a day's worth of work means.

My theory is admittedly incomplete, but I think it explains the events of the past few weeks as well as or better than anybody else's. As a careful scientist, I will refrain from discussing whether the effect of this radiation upon the brain is reversible until more data are in.

Jay A. Labinger
California Institute of Technology

SIR: The ability of American science to quickly change gears and begin to exploit new ideas is an admirable trait. However, the haste with which many have moved to attempt cold fusion is unseemly at best, and at worst probably irresponsible.

We are repeatedly hearing talk of explosions and we are seeing experiments being performed by people whose backgrounds would suggest that they have little or no experience in the handling of radionuclides, or radiation in general. If newspaper reports can be believed, people are literally risking life and limb—at least of their graduate students and possibly of others—by undertaking experiments without adequate facilities or planning. This is not appropriate behavior for mature scientists, this is the behavior of little boys who just got a chemistry set for Christmas.

I think that the situation is particularly well demonstrated by the fact that many of these investigators were apparently surprised by the explosions. This surprise demonstrates that they did not even undertake a literature search before beginning experimentation. Even the most cursory examination of the literature will reveal that palladium cathodes are prone to explosions. See, for example, Moeller, T., "Inorganic Chemistry: an Advanced Textbook," (John Wiley, New York, page 411, 1952).

Since ethics in society is a current hot topic, I would also suggest that it might be most interesting to involve the Government Accounting Office in a study of just how this enormous new fusion effort is being funded. Although pure speculation on my part, I would be willing to place a fairly large bet that a very large percentage of principal investigators are funding this new work using granting agency funds that were appropriated with no mention whatever of the word fusion or even the words "new energy sources." I will also bet that many of these principal investigators will write annual progress reports that somehow fail to describe how they diverted their graduate students away from granting-agency goals for a large part of the year.

In short, should we be wondering just how much of this new work amounts, in a strictly legal sense, to simple misappropriation of funds? There is no question that our scientific establishment needs to have some flexibility, but I think we should seriously question whether it is advisable and proper to obtain that flexibility by bending the rules and thereby teaching our graduate students to bend the rules.

I think that we should all consider the message we send to society at large, when we implicitly condone such improper behavior from our most preeminent scientists. Are we not saying to the

Companies Offer Profit-Sharing Packages to More Employees

Major chemical producers hope to increase employee participation through incentives based on company performance

Ann M. Thayer,
C&EN Northeast News Bureau

New jargon is cropping up in descriptions of employee benefits from some of the major chemical companies. Phrases such as "quality processes," "contingent compensation," and "variable pay" are occurring more and more frequently. However, the meaning of these terms and how they relate to real paychecks may not be clear to some. And although it appears that sizeable gains may be possible, there may also be some sizeable risks. The consequence is that salaries will be linked to new roles for all levels of employees in industry.

In the past decade, industry in general has been turning toward the use of contingent compensation, programs that link employee compensation to the performance of the business. The results of a survey by Hay Group, a Philadelphia-based management consulting firm, indicate that the chemical and pharmaceutical industries are beginning to put such programs in place. But they lag the rest of industry in incentive programs for small groups and gain-sharing plans based solely on productivity. However, special payments to individuals for significant contributions to the company are prevalent in the chemical industry.

It is not surprising that companies are moving toward contingent compensation. Mature, technology-based industries may find that increased profitability will come about only through increased productivity and cost-containing measures. Although the chemical industry is currently in the midst of a boom, increased costs, capacity additions coming on-line, and smaller increases in earnings might lead to a bust in the early 1990s. With the massive terminations of the early 1980s behind them, Hay Group says, U.S. businesses are committing themselves to controlling the base salary levels of their existing work forces and to introducing more variable pay programs.

"There is really a change in mentality toward pay," says Steven E. Gross, vice president and general manager of Hay Management Consultants, a division of Hay Group. "As companies reposition themselves for the 1990s, they are leaner and meaner, with fewer layers of middle management, and they are trying to make the pay system support some of their cultural changes of the past few years." These changes include an emphasis on employee participation to increase productivity and profitability and a shift away from an "entitlement attitude" on the part of employees toward pay increases.

Steel: company performing better

Employee incentives through profit sharing generally take the form of a cash bonus, the amount of which is linked to earnings growth, return on investment, or other measures of a company's performance. "Employees have to believe that they can make a difference and can impact on the measurement," comments Gross. "They have to understand the measurement and accept that it makes sense,

Chemical industry lags in incentive programs

Program type	Industry in general[a]		Chemicals/pharmaceuticals[b]	
	In place by September 1988	Considering	In place by September 1988	Considering
Gain sharing[c]	14%	23%	5%	14%
Profit sharing[d]	29	12	35	5
Small group incentives	25	24	11	11
Lump-sum payments[e]	26	22	27	16
Key contributions by individuals	34	21	70	5

a 952 companies b 41 companies c Bonus based on increased productivity d Bonus based on company's financial performance e One-time payment in lieu of salary increase. **Source:** 1988 Hay Management Compensation Conference Survey

or you will not get the changes you are looking for." Gross believes that it is important to have a plan include all levels of employees, from management to the hourly worker to support staff.

To have a promising incentive program, it should be carefully designed and implemented. Gross explains that a company should communicate the details and aim of the program effectively, set a reasonable goal, and determine an equitable size for a group of participating employees. "The best measurement is based on the smallest unit," says Gross, "but in the chemical industry, where it is so process-oriented and the integration is much greater, it makes sense to choose somewhere between an individual and the entire company, or the employees will suffer a lot of factors outside their control."

Gross worked with a team from Du Pont to help design an "achievement sharing" program for its fibers department (C&EN, Nov. 7, 1988, page 8). The department, Du Pont's second largest in sales, had nearly $6 billion in sales and more than $700 million in earnings in 1988. It is made up of about 25 businesses with 20,000 employees, trimmed down from 27,000 in the mid-1980s, whose performance is being gauged together under the program. Robert P. McNutt, a fiber-marketing executive who leads Du Pont's team, believes that having the program encompass the "larger whole" rather than separate business units was the fairest way in which to set attainable goals.

Under the plan, 6% of employees' salaries is at-risk, and an annual goal of 4% real growth in earnings is set for the department. If the goal is reached, which is not unreasonable based on past performance, employees will get back the 6%, receiving the full 100% of their salaries. When levels up to 150% of the goal are reached, the company is prepared to pay employees as much as an additional 12% of their salary base. Employees receive only 94% of their salary, losing the 6% at-risk, when 80% or less of the goal is met. It is not inconceivable that the department can be making a profit, even with growth in earnings of less than 4%, yet employees will lose 6% of their pay. For Du Pont, this would save the company tens of millions of dollars.

Doyle: folks now look at bottom line

The driving forces behind variable pay plans are really changes in attitude rather than attempts to control costs, suggests Gross, although the latter would help in the event of a business downturn. He points to the great upside potential for employees and the willingness of companies to share in profits. Despite the potential for healthy bonuses, critics question whether employees will be taking it on the chin in hard times, forfeiting a percentage of their salaries, while the financial blow to companies is somewhat lessened.

Du Pont's program is being implemented incrementally as of Jan. 1, 1989. This means that, over the next three to five years, 2% (at most) of an individual's salary is taken from pay increases and put into the plan. McNutt indicates that the plan is "building momentum." Having salary at-risk is a very important part of the program, as it "reinforces a feeling of ownership and really gets people's attention."

To initiate the program, a voluntary accelerated participation option was offered in October 1988 to allow people to become vested early. McNutt was surprised to find, and considers it a vote of confidence, that more than half of the department's employees agreed to have an initial 2% of their salaries put at-risk. Separate from this option, an incentive payment reflecting what would have been received had 2% been placed at-risk in 1988 was given in February 1989 to all employees eligible for the program. With growth in earnings reaching 4.5% in 1988 (112.5% of the goal), employees received a bonus equal to 3% of their salaries.

It is still a bit early to tell whether Du Pont's or any other chemical company's profit-sharing program has had the desired results. Currently, these programs are being set up when times are good and employees may expect to receive their salaries or slightly more. Although the potential monetary returns are expected to motivate employee behavior, the chemical industry has yet to go through a downturn and to see any repercussions when employees lose money put at-risk.

People need time to adjust to changes, comments McNutt, especially older employees who are accustomed to more traditional forms of compensation. He emphasizes that a change in pay policy should support or reflect changes already occurring in the environment of the company and not vice versa. These changes can include redirecting attitudes toward quality performance, increasing employee participation, and/or opening up channels of communication.

Union Carbide has taken a similar attitude toward its corporate environment with an "excellence through quality" program in its chemicals and plastics group. The group was formed about a year and a half ago to combine Carbide's chemical businesses. As part of the new alignment and to further unite employees, a profit-sharing program has just recently been introduced. "This is the basis of our beginning to think of [the group] as a total entity," says Lawrence F. Doyle, human resources vice president of the group. "The genesis of our incentive-pay plan is really our excellence through quality process," he adds. "It's an attempt to tie our compensation strategy to the very things we are trying to do from a management perspective."

Carbide's profit-sharing program

covers 14,000 employees including the group president and some union employees. On April 1, employees received a one-time payment equal to four weeks' pay. At that time, they began foregoing 1989 wage and salary increases. This will continue until pay levels are 5% below what they would have been without the plan—5% amounts to about $25 million of the company's payroll.

When the chemical and plastic group's performance meets its target of a 12% return on capital, the employees break even. (Return on capital is the ratio of sales, less operating expenses and taxes, to assets and investments in the business.) The program kicks in at an 8% return, equivalent to $100 million in operating profits per quarter, below which the employees forfeit the 5% of salary at-risk. A maximum bonus of 10% of salary is awarded with a 22% return on capital, or about $280 million in earnings per quarter.

Returns will be reported on a quarterly basis to the employees and payments will be made each February. "We now have five excellent opportunities every year when employees are going to be very much interested in what is going on in the business," says Doyle. "The whole plan is predicated upon that and, with 14,000 folks looking at the bottom line, we know we are going to make an impact on business.

"We recognize that the marketplace for commodities has an awful lot to do with good times and bad times, but, even within that, we believe that the leverage from getting our employees heavily involved and invested in this plan can make a difference of 2 or 3% on our return on capital."

In addition to offering employees "homeowner" stakes in the company, rather than "tenant" status, profit-sharing programs are also being touted as a new form of personal job security. "In addition to what we hope we'll be sharing in the good times, we hope to be able to moderate our salary decreases, or freezes, or even terminations in bad times by virtue of having our fixed costs lower by 5%."

In considering all the same factors, Occidental Chemical decided instead to introduce a plan that does not require the employees to put any of their salary at-risk. Whereas many companies feel that the risk factor is a necessary incentive, J. Roger Hirl, president and chief operating officer of Occidental Chemical, believes otherwise. "By not putting any compensation at-risk, I think we have avoided the negative part of this thing that might occur in a downturn.

"The decision to proceed with a program was based not only on the fact that the performance of the employees was very good in 1988, but also that over a five-year period our chemicals unit has had very, very significant growth." Much of this growth was due to acquisitions by the company. Occidental Chemical's reward-sharing program includes about half of the 15,000 employees in all its chemical operations—Oxychem and Cain Chemical.

When return on investment reaches 20% for the company, nonunion employees will receive a cash payment equal to 10% of their salary. The program is capped at a level of 30% return-on-investment which yields a 20% bonus. The program was implemented for the calendar year 1988 and paid employees a bonus of 16.4%, based on a 26.4% return on investment—a sizeable, yet not unusual, return for the company.

Hirl believes that even in a highly technical and process-oriented industry such as chemicals, incentive programs that give employees a "stakeholder" interest in the corporation can work. "By containing costs, and improving efficiency and productivity in every facet of the company, the employee gets a share of the benefits." In addition, notes Hirl, management benefits from employee initiative, increased self-management, and a greater focus on common objectives. "I don't mean to suggest that this [kind of program] works in any other corporation," says Hirl, "but in our organization it is something that works well."

In November 1988, Hoechst Celanese announced a similar, company-wide performance-sharing plan for its 22,000 employees, to be effective for all of 1988. "One of the very

Employees can win and lose in sharing programs

Four major chemical companies have implemented programs that provide employees with a means to share in the earnings of the business. Employees will receive cash payments, equal to a percentage of their salaries, if the goals set for the performance of the company are met. In some cases, if performance levels are not met, that portion of the salaries put at-risk would not be paid. The programs summarized below are open to all levels of salaried and wage-earning employees; union employees often participate in these plans once negotiations include them in contracts.

Company (unit)	Number of employees	Plan name	% salary at-risk	Potential salary return	Conditions for return
Du Pont (fibers)	20,000	Achievement sharing	6%	−6 to 12%	80 to 150% of 4% growth in earnings[a]
Union Carbide (chemical and plastics)	14,000	Profit sharing	5	−5 to 15	8 to 22% return on capital[b]
Occidental and Cain Chemical	7,500 to 8,000	Reward sharing	0	10 to 20	20 to 30% return on investment
Hoechst Celanese	22,000	Performance sharing	0	0 to 7	75 to 125% of undefined profit goal

a 6% of salary at-risk recovered when 100% of goal met. b 5% of salary at-risk recovered with 12% return on capital.

first decisions that was made by our newly merged corporation had to do with what will be our policy as it relates to compensation," says Hoechst Celanese's vice president for administration Gene Steel. The overall emphasis on performance and quality after the merger of Celanese and American Hoechst resulted in, says Steel, "our company performing better than it otherwise would have. Our commitment is to share with our employees as we see these improvements in performance."

Hoechst Celanese's plan does not require the employees to put any salary at-risk. Employees can receive cash rewards equal to 0 to 7% of their salary when the company reaches 75 to 125% of its earnings growth target. Although the company declines to identify specific figures for the target, the measure is based on internal indicators and profits, and reportedly takes into account all costs, assets, inflation, and the marketplace in an attempt to set a realistic goal. In 1988 the company reached its objective and paid 7% to each employee for a companywide total of more than $40 million.

Hoechst Celanese and Occidental Chemical have not changed their current compensation policies, adding their bonus plans on top of cost-of-living or individual merit-based salary increases. Carbide will return to a more usual compensation policy once its plan is in effect. All four companies, especially those like Du Pont with plans that put pay at-risk, indicate that they will keep base-pay levels competitive with the rest of the chemical industry.

The Hay Group survey indicates that average salary increases in the chemical and pharmaceutical industries for 1989 for all levels of management will be in the vicinity of 4.5%, about 0.5 to 1% below overall industry averages. Thus, through profit-sharing programs, employees have the potential to do better, but also worse, than they would with an average raise. Observers of the industry are waiting to see if wages and associated benefits rise more slowly in the future since the bonuses are not compounded into base-pay levels. □

Aerosol output rises again, tops '73 level

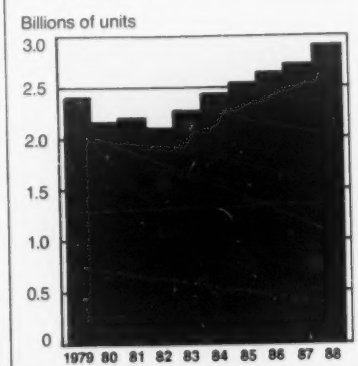
The 3 billion unit year still eludes the U.S. aerosol industry, but just barely, according to the latest annual pressurized products survey from the Chemical Specialties Manufacturers Association. At CSMA's midyear meeting in Chicago, survey committee chairman Daniel P. Minogue, vice president of sales for Precision Valve, revealed that an estimated 2.91 billion container units were filled in 1988, up 6.8% from 1987.

The increase marks the sixth consecutive year of real growth for the industry. It's also notable that production has finally returned to—and slightly surpassed—1973 levels. Aerosol output peaked that year at 2.90 billion units. Then it went into decline in the aftermath of the ozone-chlorofluorocarbon controversy, bottoming out at 2.10 billion units in 1982.

Among the various product categories, personal care products continued to be the largest, accounting for about 38% of the total. The committee estimates that 1.1 billion units of personal care products were filled last year, an increase of 14% from 1987. Minogue notes that a proliferation of new eye care products helped fuel growth in the category.

Household products, the perennial runnerup, accounted for 22% of the total. In contrast to the healthy growth in personal products, however, the 650 million units filled in the household products category represented only a 1.6% increase from 1987.

Aerosol production rose 6.8% in 1988



Source: Chemical Specialties Manufacturers Association

The category showing the greatest year-to-year percentage increase was the third place automotive and industrial products category. At 440 million units filled, representing 15% of the total, it was up 16% from 1987.

There may be a partial explanation for the apparently strong year for auto and industrial products and the apparently flat year for household products. Minogue points out that participants received new and detailed reporting instructions for the 1988 survey. For instance, all lubricants were to be included in the automotive and industrial products category. Thus, 1988 numbers for that category probably included lubricants formerly reported as household products.

Paints and finishes came in fourth. The 331 million units filled in that category accounted for 11% of the total and represented a 7.8% increase from 1987.

Food products also showed a healthy increase. Total fillings for 1988 amounted to 157 million units (5.4% of the total), up 12% from the preceding year. Pan sprays, cheese-like products, and "whipped" dessert toppings were among the major items in the category.

Of the other product categories, insect sprays accounted for 190 million units (6.5% of the total), essentially unchanged from 1987. The definition for that category was changed to exclude products used directly on animals. So it's likely that products formerly listed as insect sprays were counted as animal sprays in the 1988 figures.

Despite the change in classification, the animal products category dropped precipitously in 1988. Only 8 million units were filled, a figure that is down 64% from 1987. Similarly, the miscellaneous category was down sharply to 30.6 million units filled, a 62% decrease from 1987. Again, that's partly because products formerly reported as miscellaneous are now included in other categories.

Ward Worthy

Female Chemistry Faculty Numbers Remain Low

The toehold that women have in the faculties of Ph.D.-granting chemistry departments continues to grow. But it is still only a toehold—an average of slightly more than one per department. And women are still underrepresented in the ranks of new members joining these faculties.

These are the major findings that can be gleaned, or inferred, from the latest survey by the American Chemical Society's Women Chemists Committee of tenured and tenure-track faculty positions in graduate chemistry departments. The study reveals that in 1986 women held 4.9% of such positions, 218 of a total of 4453. This compares with 4.4% two years earlier, 189 of a total of 4327, and indicates that less than 10% of new hires between 1984 and 1986 were women. Women have earned about 20% of chemistry Ph.D. degrees in recent years.

Data for the new study, which is the latest in an every-two-year series dating back to 1970, were compiled from information provided by chemistry departments to two ACS publications, the Directory of Graduate Research 1987 and College Chemistry Faculties (7th Edition, 1986). The study was prepared by Kathleen M. Trahanovsky, a member of the Iowa State University chemistry faculty, and Doris C. Lorz, emeritus professor at Southwest Missouri State University.

The new report quantifies the steady, if still modest, overall progress that women have made in penetrating graduate chemistry faculties in the longer term. In 1970, only 61 of 4091, or 1.5%, of tenured and tenure-track positions were held by women. Also, the number of departments with no women has declined from 76% in 1970 to 35% in 1986. But even in 1986, only 32% of the departments had at least two women members and were thus free of any possible charge of having, at most, a single, token woman.

Women do somewhat better in the chemistry departments of B.S.- and M.S.-granting institutions. The new study indicates that women held about 11.2% of tenured or tenure-track positions at these departments in 1986. This is up only very slightly from 11.0% in 1984. And it is down from the 12.0% reported for 1965 by the Women Chemists Committee.

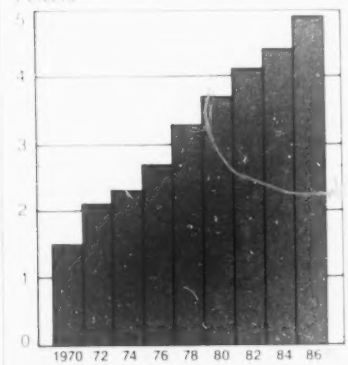
The largest proportion of women in a graduate chemistry department in 1986 was at the University of Idaho, with three of 13. The department with the most women, seven, was that at the City University of New York (CUNY). Second, with five, was Rutgers University, New Brunswick. The buildup of women at CUNY has occurred since 1976. Rutgers has long had a relatively high number of women, with four in 1970 and a high of seven in 1974.

Women in appreciable numbers are relatively new to the four departments with four women in 1986—the University of California, San Diego; Mississippi State University; the University of Minnesota; the University of California, Berkeley; and the University of Delaware. With the exception of the University of Delaware, all these faculties were all-male in 1970. Delaware had one woman in 1970.

The largest all-male graduate chemistry faculties in 1986 were the University of Wisconsin, Madison, 37, and Arizona State University, 34.

Michael Heylin

Women still less than 5% of chemistry faculties



a [illegible] Source: [illegible]

These chemistry faculties had no women[a] . . .

School	Total faculty
U of Wisconsin, Madison	37
Arizona State U	34
Northwestern U	30
U of Utah	30
Virginia Poly Inst	29
Georgia Inst of Tech	28
Notre Dame U	28
San Diego State U	27
U of Georgia	26
U of South Carolina	26
Oregon State U	25
U of Virginia	25
U of Iowa	24
Yale U	24
U of Arkansas	23
Washington U, St. Louis	23

. . . these had three or more female faculty members[a]

School	Faculty	
	Total	Women
City U of New York	81	7
Rutgers U, New Brunswick	41	5
U of California, San Diego	43	4
Mississippi State U	33	4
U of Minnesota	41	4
U of California, Berkeley	58	4
U of Delaware	30	4
U of Maryland	47	3
U of North Carolina	35	3
Rensselaer Poly Inst	31	3
U of Idaho	13	3
Poly Inst of New York	17	3
American U	18	3
U of Puerto Rico	19	3
Utah State U	25	3
U of Oregon	27	3
U of Michigan	37	3

a In 1986–87. **Note:** University of Massachusetts Associated Five-Year Graduate Faculty had six women, out of a total of 26.